

Human Exposure To Radiofrequency Fields Guidelines For Cellular & PCS Sites

FCC Consumer Facts

Background

Primary antennas for cellular and PCS transmissions are usually located outside on towers, water tanks and other elevated structures like rooftops and sides of buildings. The combination of antenna towers and associated electronic equipment is referred to as a "cellular or PCS cell site," or "base station." Typical heights for cell site towers are 50-200 feet. Antennas are usually arranged in groups of three with one antenna in each group used to transmit signals to mobile units, and the other two antennas used to receive signals from mobile units.

At a cell site, the total radiofrequency (RF) power that could be transmitted from each transmitting antenna depends on the number of radio channels (transmitters) that have been authorized by the Federal Communications Commission (FCC) and the power of each transmitter. Although the FCC permits an effective radiated power (ERP) of up to 500 watts per channel (depending on the tower height), the majority of cellular sites in urban and suburban areas operate at an ERP of 100 watts per channel or less.

An ERP of 100 watts corresponds to an actual radiated power of 5-10 watts, depending on the type of antenna used. In urban areas, an ERP of 10 watts per channel or less is commonly used. For PCS cell sites, even lower radiated power levels are normally used. As with all forms of electromagnetic energy, the power density from a cellular or PCS transmitter rapidly decreases as one moves away from the antenna.

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Consequently, normal ground-level exposure is much less than the exposure that might be encountered if one were very close to the antenna and in its main transmitted beam. Measurements made near typical cellular and PCS cell sites have shown that ground-level power densities are well below the exposure limits recommended by RF/microwave safety standards used by the FCC.

Guidelines

The FCC has authorized cellular and PCS carriers to provide service in various service areas around the country. In 1996, the FCC adopted updated guidelines for evaluating human exposure to RF fields from fixed transmitting antennas such as those used for cellular radio and PCS cell sites. The FCC's guidelines for cellular and PCS cell sites are identical to those recommended by the National Council on Radiation Protection and Measurements (NCRP), a non-profit corporation chartered by Congress to develop information and recommendations concerning radiation protection. The FCC's guidelines are also similar to the 1992 guidelines recommended by the Institute of Electrical and Electronics Engineers (IEEE), a non-profit technical and professional engineering society, and endorsed by the American National Standards Institute (ANSI), a non-profit, privately-funded, membership organization that coordinates development of voluntary national standards in the United States.

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In the case of cellular site transmitters, the FCC's RF exposure guidelines recommend a maximum permissible exposure level to the general public of approximately 580 microwatts per square centimeter. This limit is many times greater than RF levels typically found near the base of cellular towers or in the vicinity of other, lower-powered cell site transmitters.

Calculations corresponding to a "worst-case" situation (all transmitters operating simultaneously and continuously at the maximum licensed power) show that in order to be exposed to levels near the FCC's limits for cellular frequencies, an individual would essentially have to remain in the main transmitting beam and within a few feet from the antenna for several minutes or longer. This makes it extremely unlikely that a member of the general public could be exposed to RF levels in excess of these guidelines from cellular site transmitters. For PCS cell site transmitters, the same type of analysis holds.

When cellular and PCS antennas are mounted at rooftop locations, it is possible that RF levels could be higher than desirable on the rooftop itself. This might become an issue if the rooftop were accessible to maintenance personnel or others. However, exposures exceeding the safety guidelines are only likely to be encountered very close to, and directly in front of, the antennas. Even if RF levels were higher than desirable on a rooftop, appropriate restrictions could be put in place in each case to avoid exposure in excess of the guidelines. Factoring in the time-averaging aspects of safety standards could also be used to reduce potential exposure for persons working on the roof. Excessive exposure conditions on rooftops are even less likely because rooftop cellular and PCS antennas usually operate at lower power levels than antennas on free-standing towers. Those living or working within the building are not at risk.

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The deadline for licensees to comply with the FCC's RF exposure guidelines was September 1, 2000. The FCC may further investigate specific complaints where there is credible evidence of violations of these guidelines.

For additional information on exposure to radio frequency fields, you can visit www.fcc.gov/oet/rfsafety. For general information on other telecommunications-related issues, you can contact the FCC's Consumer and Governmental Affairs Bureau in the following ways:

Internet at: www.fcc.gov/cgb
Telephone: 1-888-CALL-FCC (1-888-225-5322)
voice; 1-888-TELL-FCC (1-888-835-5322) TTY

FCC's Office of Engineering & Technology
RF Safety Line: 202-418-2464

FCC Address:
Federal Communications Commission
445 12 St. SW
Washington, DC 20554.

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